#9 BM 9-25-03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	:	**Confirmation No. 5779**
Tadashi WATANABE et al.	:	Docket No. 2001_0142A
Serial No. 09/779,546	:	Group Art Unit 1774
Filed February 9, 2001	:	Examiner Lawrence D. FERGUSON

PLASTICS-COVERED METAL PLATE FOR CAR

DECLARATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Akiko KOJIMA, declare and say:

that I am thoroughly conversant in both the Japanese and English languages;

that I am presently engaged as a translator in these languages;

that the attached document represents a true English translation of the Japanese Priority Application No. 2000-33180, filed February 10, 2000.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 2nd day of July, 2003.

Akiko Kojima

Akiko KOJIMA

(TRANSLATION)

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this Office.

Date of Application : February 10, 2000

Application Number: Patent Application No. 2000-33180

Applicant(s) : KANSAI PAINT CO., LTD.

March 2, 2001

Kozo OIKAWA

Commissioner,
Patent Office

Certification Number 2001-3014398

[Document Name] Patent Application

[Reference Number] 10015

[Addressed to] Commissioner, Patent Office

[International Patent Classification] C09D

[Inventor]

[Address] c/o Kansai Paint Co., Ltd.,
17-1, Higashiyawata 4-chome, Hiratsuka-shi, Kanagawa-ken

[Name] Tadashi WATANABE

[Inventor]

[Address] c/o Kansai Paint Co., Ltd.,
17-1, Higashiyawata 4-chome, Hiratsuka-shi, Kanagawa-ken

[Name] Tadayoshi HIRAKI

[Inventor]

[Address] c/o Kansai Paint Co., Ltd.,
17-1, Higashiyawata 4-chome, Hiratsuka-shi, Kanagawa-ken

[Name] Akira TOMINAGA

[Inventor]

[Address] c/o Kansai Paint Co., Ltd.,
17-1, Higashiyawata 4-chome, Hiratsuka-shi, Kanagawa-ken

[Name] Takeshi YAWATA

[Applicant]

[Identification Number] 000001409

[Name] Kansai Paint Co., Ltd.

[Representative] Tamotsu SHIRAIWA

[Indication of Official Fee]

[Number of Register of Prepayment] 000550

[Amount of Payment] 21000

[List of Submitted Objects]

[Name of Object] Specification 1

[Name of Object] Abstract 1

[Proofing] Required

[Document Name] Specification

[Title of the Invention] Plastics-Covered Metal Plate for Car

[Claims]

[Claim 1] A plastics-covered steel plate for car body characterized by being made by covering one surface or both surfaces of the metal plate with at least two kinds of plastics layers whose rate of elongation is different.

[Claim 2] The plastics-covered steel plate for car body set forth in Claim 1 which is covered with a multilayered plastics layer made by laminating a plastics layer (A) with smaller rate of elongation at the upper layer side and a plastics layer (B) with larger rate of elongation at the lower layer side.

[Claim 3] The plastics-covered steel plate for car body set forth in Claim 2 wherein the rate of elongation of the plastics layer (B) is larger than the rate of elongation of the plastics layer (A) by at least 10%.

[Claim 4] The plastics-covered steel plate for car body set forth in Claim 3 wherein the rate of elongation of the plastics layer (A) (speed of elongation 20 mm/minute/20°C) is 1 to 100%.

[Claim 5] The plastics-covered steel plate for car body set forth in Claim 2 wherein the oxygen permeability of the plastics layer (A) in its single coating film at 25°C is less than 10^{-11} $cm^3 \cdot cm/cm^2 \cdot sec \cdot cmHg$.

[Claim 6] The plastics-covered steel plate for car body set forth in Claim 2 wherein a plastics layer (A) is further laminated at the lower layer of the plastics layer (B).

[Claim 7] A process of covering a car body characterized by forming a shell body of a car body using partly or totally the above-mentioned plastics-covered steel plate and then by electrodeposition coating the portion of the shell body where metal is exposed.

[Detailed Description of the Invention]

[0001]

[Technical field to which the invention belongs]

The present invention relates to a metal plate which is covered with at least two kinds of plastics layers whose rate of elongation is different, and it includes forming a car body, which is excellent in chipping resistance, corrosion resistance, etc., by using the covered metal plate.

[0002]

[Prior art and the problems]

In a car body of a normal or small passenger car, the portion constituted mainly with a sheet metal without riggings such as engine or chassis is called a shell body. Usually the shell body consists of a main body, consisting of an underbody, a side member, a roof, a cowl, an upper back, a lower back, etc., and outer cover parts such as a hood, a front balance, a front fender, a cowl louver, a door, a luggage (back door), etc.

[0003]

Up to the present, in order to form these main body and outer cover parts, a metal plate is cut and shaped in the size and shape of each constituting part and they are assembled into a shell body, which is dipped into a cationic electrodeposition paint bath to form an undercoat coating film by electrodeposition coating on the surface, backside, and edge surface portion of the metal plate. Then, the outer surface portions are coated with an intermediate paint, a topcoat paint, etc.

[0004]

Recently, however, in the field of car body coating, operation step saving, energy saving, and reduction of CO_2 in the coating line are strongly desired. Moreover, further improvement in throwing power of the electrodeposition paint to the edge surface portion, and in chipping resistance, corrosion resistance, etc. of the total coating film, is required. In order to improve the chipping resistance, there has been proposed to coat a barrier paint to form a viscoelastic coating film between the layers of these coating films. This has, however, defects that the number of coating steps increases and also the manufacturing cost increases.

[0005]

[Means to solve the problems]

The present inventors have repeatedly conducted studies to solve the problems of a car body as mentioned above. As a result, this time, they found that a metal plate, covered with more than two kinds of plastics layers whose rates of elongation are different, is excellent in chipping resistance, corrosion resistance, etc., and the above-mentioned defects can be dissolved

by using it for a part or total of the car body. Thus, they completed the present invention.

[0006]

According to the present invention, there is provided

1. a plastics-covered steel plate for car body characterized by being made through covering one surface or both surfaces of a metal plate with at least two kinds of plastics layers whose rate of elongation is different (the present covered steel plate), and

2. a process of covering a car body characterized by forming a shell body of a car body by using the above-mentioned present covered steel plate and then by electrodeposition coating the portion of the shell body where metal is exposed (the present covering process).

[0007]

Then, the plastics-covered steel plate for car body and the process of covering a car body of the present invention are described in more detail.

[0008]

The present covered steel plate can be applied mainly as a constituting element of a car body of a normal and small passenger car, but can be applied also to a truck, a bus, a motorcycle, a vehicle with special kind of equipments, etc. in the same manner.

[0009]

As a metal plate to be covered with a plastics layer, those which have been used for a car body until now can be applied in the same manner, and there can be mentioned, as a material, for example, iron, steel, stainless steel, aluminium, copper, and alloys containing these metals, and further, metal plates made by plating their surface with zinc, zinc/nickel, iron, etc. They can be applied in the shape of coils or cut plates. A thickness of the metal plates is suitably in the range of usually 0.3 to 2.0 mm, particularly 0.5 to 1.0 mm. It is preferable that the surface of these metal plates is treated suitably by grinding, by degreasing, with phosphate, etc. in order to improve the adhesivity with a plastics layer, corrosion resistance, etc.

[0010]

The present covered steel plate is a plastics-covered steel plate for a

car body characterized by being made through covering one surface or both surfaces of such metal plates with at least two kinds of plastics layers whose rate of elongation is different.

[0011]

The "rate of elongation" of a plastics layer means a rate between the length of the plastics layer, which has been made by forming a film of 20 mm long and 5 mm wide, at the time of breakage of the film when being drawn at the speed of 20 mm a minute at +20°C, and the original length. For example, when a film of 20 mm long is broken at the time when it is stretched to 30 mm, its rate of elongation is 50%.

[0012]

The present covered steel plate is covered one surface or both surfaces of a metal plate with at least two kinds of plastics layers whose rate of elongation is different, and it is obtained, for example, by laminatedly covering both a metal plate with a plastics layer (A) whose rate of elongation is relatively smaller and a plastics layer (B) whose rate of elongation is larger. The order of covering with these plastics layers is not particularly restricted and can be selected optionally according to the purpose. It is particularly preferable, however, that the plastics layer (B) whose rate of elongation is larger is placed at the side of the metal plate and the plastics layer (A) whose rate of elongation is smaller is placed thereon, that is, they are laminated in the order of metal plate, plastics layer (B), and plastics layer (A).

[0013]

The rates of elongation of the plastics layer (A) and the plastics layer (B) are different, and it is preferable, for example, that the rate of elongation of the plastics layer (B) is larger than that of the plastics layer (A) by at least 10%, preferably 50 to 200%. The rate of elongation of the plastics layer (A) itself is preferably in the range of 1 to 100%, particularly 5 to 70%.

[0014]

In the present covered steel plate, as modes of covering on one surface or both surfaces of a metal plate with the plastics layers whose rate of elongation is different, there are mentioned, for example, the following:

1) A covered steel plate made by covering with 2-layered plastics

layer made by covering with the plastics layer (B) with larger rate of elongation and then the plastics layer (A) with smaller rate of elongation successively from the side of the metal plate.

2) A covered steel plate made by covering with 3-layered plastics layer made by covering with the plastics layer (A), the plastics layer (B), and the plastics layer (A) successively from the side of the metal plate.

[0015]

The oxygen permeability of the plastics layer (A) in its single coating film at 25°C is preferably 10^{-11} $cm^3 \cdot cm/cm^2 \cdot sec \cdot cmHg$ or less, particularly 10^{-12} $cm^3 \cdot cm/cm^2 \cdot sec \cdot cmHg$ or less, because the corrosion resistance of the present covered steel plate to be obtained is further improved.

[0016]

As a plastics material of the plastics layer having such a rate of elongation and further the above-mentioned oxygen permeability, there can be used per se known substances, for example, thermoplastic resins including a polyolefin resin such as polyethylene, polypropylene, etc., a polyester resin such as polyethylene terephthalate (PET), etc., a polycarbonate resin, an epoxy resin, a vinyl acetate resin, a vinyl chloride resin, a fluorine-containing resin, a polyvinyl acetal resin, a polyvinyl alcohol resin, a polyamide resin, a polystyrene resin, an acrylic resin, a polyurethane resin, a phenolic resin, a polyether resin, a cellulose type resin, etc. They may contain a color pigment, an extender pigment, etc. Adjustment of the rate of elongation and oxygen permeability of the plastics layer can be easily conducted according to a composition and a ratio of these plastics, pigments, etc.

[0017]

As a process of covering a metal plate with a plastics layer, there are mentioned, for example, a process of previously laminating the above-mentioned plastics layer (A) and plastics layer (B) and then sticking it to the metal plate, or a process of successively laminating one layer after another to the metal plate.

[0018]

Covering of a metal plate with a plastics layer can be conducted by processes, for example, by sticking plastics in film shape or sheet shape

previously formed to the metal plate by an extrusion molding, an injection molding, a calender molding, a compression molding, etc.; by pressure-sticking thermally molten plastics extruded in film shape or sheet shape to the metal plate; or by adhering plastics in powder form to the metal plate by a fluidized bed coating, an electrostatic coating, etc. and then melting by heating. Covering with a plastics layer is conducted at least to the surface of the metal plate placed at the outside of a car body, but it is possible to conduct it to both sides, when desired.

[0019]

A thickness of each plastics layer covering the metal is suitably in the range of 1 to 100 μm, particularly 5 to 50 μm respectively, and a total thickness of the laminated plastics layer is suitable in the range of 5 to 120 μm, particularly 10 to 50 μm. It is also possible to treat the surface of these plastics by corona discharge, plasma, flame, etc. in advance.

[0020]

In order to increase the adhesivity to the coated surface when covering the metal plate with the plastics layer, it is preferable to previously coat an adhesive to the metal plate and/or plastics layer. As such an adhesive, there can be mentioned, for example, thermosetting or thermoplastic adhesives containing a curing agent and one or more than 2 kinds of resins selected from a bisphenol type epoxy resin, a resol type epoxy resin, an acrylic resin, an aminoplast resin, a polyester resin, an urethane resin, a polysiloxane resin, etc.

[0021]

Further, there can be used, as an adhesive, triazinethiol type compounds such as 2,4,6-trimercapto-s-triazine, 2-dibutylamino-4,6-dimercapto-s-triazine, 2,4,6-trimercapto-s-triazine-monosodium salt, 2,4,6-trimercapto-s-triazine-trisodium salt, etc.

[0022]

The present covered steel plate can be prepared by covering one surface or both surfaces of a metal plate, which has been suitably treated by grinding, degreasing, phosphate treatment, etc., with a plastics layer (A), plastics layer (B), etc. by suitably using an adhesive. As the plastics-covered portion thereof is excellent in chipping resistance, corrosion resistance, etc.,

they can be favorably applied for a car body which strongly requires such performances.

[0023]

The present covering process relates to a covering process for a car body characterized by forming a shell body of a car body using a plastics covered steel plate for a car body (the present covered steel plate) made by covering one or both surfaces of the metal plate mentioned above with at least two kinds of plastics layers whose rate of elongation is different, and then by covering the portion of the shell body where metal is exposed by electrodeposition coating.

[0024]

As a specific example of the present covering process, there can be mentioned a process wherein a main body and outer cover parts (car parts) of a car body are prepared by using the present covered metal plate prepared as mentioned above and by cutting, shaping, and combining it, and then, a shell body is formed by assembling them (the present covering process 1); and a process wherein outer cover parts (car parts) of a car body are prepared by using the present covered metal plate prepared and by cutting, shaping, and combining it, and then, a shell body is formed by assembling them with a main body (the present covering process 2).

[0025]

A shell body is the part constituted mainly with a sheet metal without riggings such as engine or chassis in a car body. The main body thereof is constituted mainly with an underbody, a side member, a roof, a cowl, an upper back, a lower back, etc., and other outer cover parts consist mainly of a hood, a front balance, a front fender, a cowl louver, a door, a luggage (back door), etc., which are called as car parts.

[0026]

An underbody here means the floor portion of a cabin, a trunk room, etc. and is named generically, including a front underbody, a front floor, a rear floor, etc. A side member forms the side of a cabin joining with a front body, a roof panel, an underbody, etc. and prevents the car from bending and/or twisting. A cowl is a panel combining left, right, front, and rear pillars. An upper

back is a panel combining left and right quarter panels (rear fenders) at the back portion of a car body and forming the outer surface of a car body.

[0027]

In the present covering process 1, in order to form each of the above-mentioned respective parts constituting the shell body, the present covered metal plate prepared as mentioned above is cut into the objected shape and size and pressure-shaped by a press etc., and they are combined, as necessary, by an adhesive, welding, bolting, etc. to prepare an underbody, a side member, a roof, a cowl, an upper back, a lower back, etc. of a main body and further parts such as a hood, a front balance, a front fender, a cowl louver, a door, a luggage, etc. of outer cover parts (car parts). These cutting, shaping, and combining can be conducted by per se known processes. Then, these respective parts formed in such a manner by using the present covered metal plate are combined and assembled to form a main body to which outer cover parts (car parts) such as a hood, a front balance, a front fender, a cowl louver, a door, a luggage, etc. are fitted.

[0028]

At least the outside of the shell body formed in such a manner by using a plastics-covered metal plate is covered with a plastics layer, and the cut edge surface portion of the metal plate has an exposed metal portion. Though it is preferable that its backside is covered with plastics, sometimes a metal portion is exposed.

[0029]

In the present covering process 2, the present covered metal plate prepared as mentioned above is cut, shaped, and combined to the main outer surface portion of a car body to prepare outer cover parts (car parts) such as a hood, a front balance, a front fender, a cowl louver, a door, a luggage, etc., and these car parts are fitted to the main body of a car body previously assembled to form a shell body. Among them, the preparation of outer cover parts (car parts) using the present covered metal plate can be conducted in the same manner as in the present covering process 1.

[0030]

In the present covering process 2, most or all of the car parts

constituting the outer cover parts are prepared by using the present covered metal plate mentioned above. For example, about each part such as a hood, a front balance, a front fender, a cowl louver, a door, a luggage (back door), etc., in order to form them, the present covered metal plate is cut into the objected shape and size and pressure-shaped by a press etc., and they are combined by an adhesive, welding, bolting, etc. to prepare each part such as a hood, a front balance, etc. These cutting, shaping and combining can be conducted by per se known processes. At least the outside of the outer cover parts formed in such a manner is covered with a plastics layer, and the cut edge surface portion of the steel plate has an exposed metal portion. Its backside may be uncovered and have an exposed metal, or covered with plastics.

[0031]

In the present covering process 2, the main body constituted with an underbody, a side member, a roof, a cowl, an upper back, a lower back, etc., to which these car parts are fitted, is prepared usually by cutting, shaping, and processing an uncoated metal plate by known processes without using the present covered metal plate, and by assembling them. The outer cover parts (car parts) prepared by using the present covered metal plate are fitted to such a main body prepared by using an uncoated metal plate, to form a shell body.

[0032]

In such a shell body prepared by the present covering process 1 and the present covering process 2, the cut edge surface portion of the present covered metal plate has naturally an exposed metal surface and further its backside occasionally has it in case of the present covering process 1; and the cut edge surface portion of the present covered metal plate, surface of the main body, and further their backside surface may have an exposed metal surface in case of the present covering process 2. Therefore, it is preferable to cover these metal exposed portions by electrodeposition coating.

[0033]

As an electrodeposition paint, either an anionic type or a cationic type can be used. Generally, however, it is preferable to use a cationic electrodeposition paint with an excellent corrosion resistance.

[0034]

As a cationic electrodeposition paint, a known substance can be used. For example, an aqueous paint containing a base resin having a hydroxyl group and a cationizable group and a blocked polyisocyanate compound (crosslinking agent) can be favorably used. As a base resin here, a per se known substance can be used, and there can be mentioned, for example, a reaction product of a polyepoxy resin and a cationizing agent, an acid-protonized product of a polycondensate of polycarboxylic acid and polyamine (cf. U.S. Patent No. 2450940), an acid-protonized product of a polyadduct of a polyisocyanate compound and polyol and mono- or polyamine, an acid-protonized product of a copolymer of an acrylic type or a vinyl type monomer containing a hydroxyl group and an amino group (cf. Japanese Patent Publication No. 12395/1970 and Japanese Patent Publication No. 12396/1970), and an acid-protonized product of an adduct of a polycarboxylic acid resin and alkylene imine (cf. U.S. Patent No. 3403088). Among them, the base resin obtained by reacting a cationizing agent to an epoxy resin obtained by reaction of a polyphenol compound and epichlorohydrin is particularly preferable because it forms a coating film excellent in corrosion resistance. As a cationizing agent, there can be mentioned, for example, amine compounds such as primary amine, secondary amine, tertiary amine, polyamine, etc. It may be possible to form a cationic group by acid-protonizing the basic group formed by using a basic compound such as ammonia, hydroxylamine, hydrazine, hydroxyethylhydrazine, N-hydroxyethylimidazoline, etc. as a cationizing agent and by reacting with an epoxy group.

[0035]

A blocked polyisocyanate compound as a crosslinking agent is a polyisocyanate compound whose isocyanate groups are substantially all blocked with a volatile blocking agent, which dissociates when heated higher than a designated temperature and the regenerated isocyanate group participates in the crosslinking reaction with the base resin.

[0036]

A polyisocyanate compound is a compound having at least two free isocyanate groups in a molecule, and there can be mentioned per se known aliphatic diisocyanate, alicyclic diisocyanate, and aromatic diisocyanate; an

urethanization adduct, a biuret type adduct, an isocyanuric ring type adduct, etc. of these polyisocyanate compounds. As a blocking agent, there can be used per se known blocking agents of phenol type, alcohol type, active methylene type, mercaptan type, acid amide type, imide type, amine type, imidazole type, urea type, carbamic acid type, imine type, oxime type, sulfurous acid type, lactam type, etc.

[0037]

A cationic electrodeposition paint can be prepared, after neutralizing cationic groups in the base resin with an acid compound such as acetic acid, formic acid, lactic acid, phosphoric acid, etc., by mixing with a blocked polyisocyanate compound in water. The pH at the time of coating is suitably in the range of generally 3 to 9, particularly 5 to 7 and the solid content concentration in the range of 5 to 30% by weight.

[0038]

To a cationic electrodeposition paint, there can be suitably compounded, as necessary, a curing catalyst having rust preventive properties such as hydroxide, oxide, organic acid salt, inorganic acid salt, etc. of a metal selected from aluminium, nickel, zinc, strontium, lead, zirconium, molybdenum, tin, antimony, lanthanum, tungsten, bismuth, etc.; an extender pigment; a color pigment; a rust preventive pigment; an antisettling agent; etc.

[0039]

In the present covering process, the shell body prepared as mentioned above is dipped into a cationic electrodeposition paint bath as a cathode and is conducted an electrodeposition coating for 1 to 10 minutes of passing a current, at 20 to 35°C of bath temperature, and 100 to 400 V of voltage, and an electrodeposition coating film is deposited to an exposed metal portion of the shell body, for example, whole surface of the main body, the cut edge surface portion of the steel plate, and further the backside surface portion which is not covered with a plastics layer. A film thickness of the electrodeposition coating film is preferably about 10 to 40 μm based upon a cured coating film. After coating, the shell body is drawn up from the electrodeposition paint bath, washed suitably with water, and heated to 100 to 200°C to cure the electrodeposition coating film. Thus, the present covering

process is achieved.

[0040]

The outer surface of the car body formed by the present covering process can be suitably further coated with an intermediate paint and/or a topcoat paint, etc.

[0041]

[Effect of the invention]

According to the present covered metal plate and the present covering process mentioned above, the following effects can be obtained.

[0042]

(1) As the metal plate is covered with more than two kinds of plastics layers, whose rate of elongation is different, its corrosion resistance, chippong resistance, etc. can be remarkably improved compared with a metal plate covered with a monolayered plastics layer.

[0043]

(2) The present covered metal plate is excellent in finishing appearance such as smoothness etc. because its plastics layer is multilayered of more than two layers.

[0044]

(3) The electrodeposition paint easily deposits thick at the boundary portion with the plastics covering film, so that the corrosion resistance of this portion is remarkably improved.

[0045]

(4) Outer cover parts such as a hood panel, a fender panel, a door panel, a luggage door panel, etc. and further a main body constituted from an underbody, a side member, a roof, a cowl, an upper back, a lower back, etc. of a car body can be prepared by using the metal plate previously covered with plastics layer, therefore, it is possible to reduce the consumption amount of the electrodeposition paint to be used in the next step.

[0046]

(5) At least the outer surface of the outer cover parts is covered with plastics layer having a high volume specific resistance, therefore, the area of the portion to be coated by electrodeposition (exposed metal portion) is small, and

consequently, the throwing power increases and particularly the corrosion resistance of the edge surface portion is improved.

[0047]

[Examples]

Then, the present invention will be described more specifically by Examples and Comparative Examples. Parts and % are by weight and a film thickness of the coating film is that of the cured coating film.

[0048]

1. Sample

Plastics film

(a) Polyester film with rate of elongation (speed of elongation 20 mm/minute/20°C) 65% and oxygen permeability 10^{-12} $cm^3 \cdot cm/cm^2 \cdot sec \cdot cmHg$ at 25°C (16 μm thick).

[0049]

(b) Polyurethane film with rate of elongation (speed of elongation 20 mm/minute/20°C) 215% and oxygen permeability 5×10^{-11} $cm^3 \cdot cm/cm^2 \cdot sec \cdot cmHg$ at 25°C (20 μm thick).

[0050]

(c) Hard polyvinyl chloride film with rate of elongation (speed of elongation 20 mm/minute/20°C) 40% and oxygen permeability 5×10^{-12} $cm^3 \cdot cm/cm^2 \cdot sec \cdot cmHg$ at 25°C (16 μm thick).

[0051]

2. Examples and Comparative Examples

Example 1

Both surfaces of the plastics film (b) (polyurethane film) are treated by corona discharge, a thermosetting polyester resin type adhesive (*1) is coated on one surface to a film thickness 7 μm and dried by heating at 120°C for 30 seconds, and the film is wound up. And both surfaces of the plastics film (a) (polyester film) are treated by corona discharge, a thermosetting polyester resin type adhesive (*1) is coated on one surface to a film thickness 7 μm and dried by heating at 120°C for 30 seconds, and the film is wound up.

[0052]

After a 0.8 mm thick steel plate, plated with alloyed molten zinc so

that the plated amount would be 45 g/m^2 (plated on both sides), is degreased and chemically treated with zinc phosphate ("PB #3080 Treatment" made by Nihon Parkerizing Co., Ltd., trade name), the plastics film (b) and the plastics film (a) both coated with the above-mentioned adhesive are stuck to one side of the steel plate in this order and heated at 200°C for 10 minutes to obtain the present covered metal plate (a) on which both films are laminated. The results of the performance test are: chipping resistance O; general portion corrosion resistance O; and image sharpness O.

(*1) Thermosetting polyester resin type adhesive

An adhesive solution with solid content 30% obtained by mixing and dispersing 90 parts of "Elitel UE3200" (polyester resin made by Unitika Ltd., trade name) and 10 parts of "Duranate TPA100" (hexamethylene diisocyanate type polyisocyanate compound made by Asahi Chemical Industry Co., Ltd., trade name) in a mixed solvent (methyl ethyl ketone/toluene = 50/50 weight ratio).

[0053]

Example 2

A thermosetting polyester resin type adhesive (*1) is coated on one surface of the plastics film (c) (hard polyvinyl chloride film) to a film thickness 7 μm and dried by heating at 120°C for 30 seconds, and the film is wound up.

[0054]

After a 0.8 mm thick steel plate, plated with alloyed molten zinc so that the plated amount would be 45 g/m^2 (plated on both sides), is degreased and chemically treated with zinc phosphate ("PB #3080 Treatment" made by Nihon Parkerizing Co., Ltd., trade name), the plastics film (c), the plastics film (b), and the plastics film (a) all coated with the above-mentioned adhesive are stuck to one side of the steel plate in this order and heated at 200°C for 10 minutes to obtain the present covered metal plate (b) on which 3-layered films are laminated in this order. The results of the performance test are: chipping resistance O; general portion corrosion resistance O; and image sharpness ◎.

[0055]

Comparative Example 1

After a 0.8 mm thick steel plate, plated with alloyed molten zinc so

that the plated amount would be 45 g/m^2 (plated on both sides), is degreased and chemically treated with zinc phosphate ("PB #3080 Treatment" made by Nihon Parkerizing Co., Ltd., trade name), the plastics film (a) coated with the above-mentioned adhesive is stuck to one side of the steel plate and heated at 200°C for 10 minutes to obtain the covered metal plate for comparison (c) on which a monolayered film is covered. The results of the performance test are: chipping resistance △; general portion corrosion resistance △; and image sharpness △.

[0056]

Comparative Example 2

After a 0.8 mm thick steel plate, plated with alloyed molten zinc so that the plated amount would be 45 g/m^2 (plated on both sides), is degreased and chemically treated with zinc phosphate ("PB #3080 Treatment" made by Nihon Parkerizing Co., Ltd., trade name), the plastics film (b) coated with the above-mentioned adhesive is stuck to one side of the metal plate and heated at 200°C for 10 minutes to obtain the covered metal plate for comparison (d) on which a monolayered film is covered. The results of the performance test are: chipping resistance △; general portion corrosion resistance ×; and image sharpness △.

[0057]

Example 3

A model of a main body (size is about 1/25 of the actual thing), consisting of an underbody, a side member, a roof, a cowl, an upper back, and a lower back, was previously prepared by cutting, shaping, and combining the present covered metal plate (a) obtained in the above-mentioned Example 1. Further, models of outer cover parts (car parts) (size is about 1/25 of the actual thing) such as a hood, a fender, a door, a luggage door, etc. were prepared by cutting, shaping, and combining the present covered metal plate (a).

[0058]

A shell body was formed by fitting these outer cover parts to the main body, and it was dipped into a cationic electrodeposition paint ("Elecron #9600 Gray", epoxy resin type, made by Kansai Paint Co., Ltd., trade name) bath to coat the exposed metal portion of the shell body by electrodeposition under the

conditions of electrodeposition bath temperature 28°C, voltage 250 V, and totally dipped current passing time 2 minutes. After washing with water, the electrodeposition coating film was cured by heating at 170°C for 30 minutes. A film thickness of the flat portion of the electrodeposition coating film was 20 μm. The result of the performance test was: the corrosion resistance of the edge surface portion ○.

[0059]

Performance test methods are as follows.

Chipping resistance:

Tests were conducted on covered metal plates obtained in Examples 1 and 2, and Comparative Examples 1 and 2.

[0060]

Using "Q-G-R Gravelometer" (made by Q Panel Co., Ltd., trade name) as a testing machine, about 50 g of No.7 crushed stones were blown onto the surface of the plastics layer at an angle of 90 at -20°C by an air pressure of about 4 kg/cm^2. After that, an adhesive cellophane tape was stuck on the plastics layer, and the state of chipping of the coating film from the portion of the plastics layer, on which the shock had been given, was visually observed, after rapidly peeling-off the adhesive tape. ○ shows that a little chipping of the plastics layer by shock was observed but there is no exposure of metal surface at all; △ shows that much chipping of the plastics layer by shock was observed and there is a little exposure of metal surface, too; and × shows that much chipping of the plastics layer by shock is observed and there is much exposure of metal surface, too.

General portion corrosion resistance:

Tests were conducted on covered metal plates obtained in Examples 1 and 2, and Comparative Examples 1 and 2.

[0061]

A cross-cut was made to the film reaching to the ground surface with a knife, and after conducting a salt water spraying test according to JIS Z-2371 for 480 hours, the width of the generated rust or blistering (one side) from the cut position was observed. ○ shows that the maximum width of the generated rust or blistering is less than 2 mm from the cut position, △ shows that the

maximum width of the generated rust or blistering is 2 to less than 3 mm from the cut position, and × shows that the maximum width of the generated rust or blistering is more than 3 mm from the cut position.

Image sharpness:

On the surface of the plastics layer of the covered metal plates obtained in Examples 1 and 2 and Comparative Examples 1 and 2, a topcoat paint ("LUGA-BAKE QM1 WHITE", aminoalkyd resin type topcoat white organic solvent type paint, made by Kansai Paint Co., Ltd., trade name) was coated so that the film thickness would be 40 μm, and the coated film was cured by heating at 140°C for 30 minutes. The image shrpness of these topcoat coating films were measured by using an image clarity-measuring equipment (made by Suga Tester Co., Ltd.). ◎ shows that the measured value is higher than 80, ○ shows that the measured value is 75 to less than 80, △ shows that the measured value is 70 to less than 75, and × shows that the measured value is less than 70.

Edge surface portion corrosion resistance:

After placing the model obtained in Example 3 in a salt water resistance spray test machine (35°C) for 240 hours, the corrosion resistance at the edge surface portion of the cut position of the present covered metal plate of the outer surface portion of the outer cover parts of the shell body (acute angle portion) was observed. ○ shows that no generation of rust or blistering at the edge surface portion is observed at all, △ shows that a little generation of rust or blistering at the edge surface portion is observed, and × shows that much generation of rust or blistering at the edge surface portion is observed.

[Document Name] Abstract

[Abstract]

[Subject]

The present invention relates to a coated metal plate which is covered with two or more kinds of plastics layers whose rate of elongation is different and which is excellent in chipping resistance, corrosion resistance, etc., and it further includes a car body which is formed by using this covered metal plate.

[Constitution]

A plastics-covered steel plate for a car body characterized by being made through covering one surface or both surfaces of a metal plate with at least two kinds of plastics layers whose rate of elongation is different, and a process of covering a car body characterized by forming a shell body of a car body by using partly or totally the above-mentioned plastics-covered steel plate and then by electrodeposition coating the portion of the shell body where metal is exposed.

[Selected Drawing]

None

Certified – Additional information

Patent Application Number	:	Patent Application No. 2000-33180
Reception Number	:	50000152071
Document Name	:	Patent Application
Person in Charge	:	Senior Person in 6th Charge 0095
Date of Executed	:	February 14, 2000

<Certified Information – Additional Information>

[Filing Date] February 10, 2000

Information of Applicant's History

Identification Number		[000001409]
1. Date of Changed	:	August 9, 1990
[Reason of Changed]	:	New Registration
Address	:	33-1, Kanzaki-cho, Amagasaki-shi, Hyogo-ken
Name	:	KANSAI PAINT CO., LTD.